

Gas Industry Standard

GIS/E34:2015

Specification for

**Pressure regulating modules with inlet pressures
above 75 mbar but no greater than 7 bar for regulators
with design flow rates greater than 6 m³/h**



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Foreword

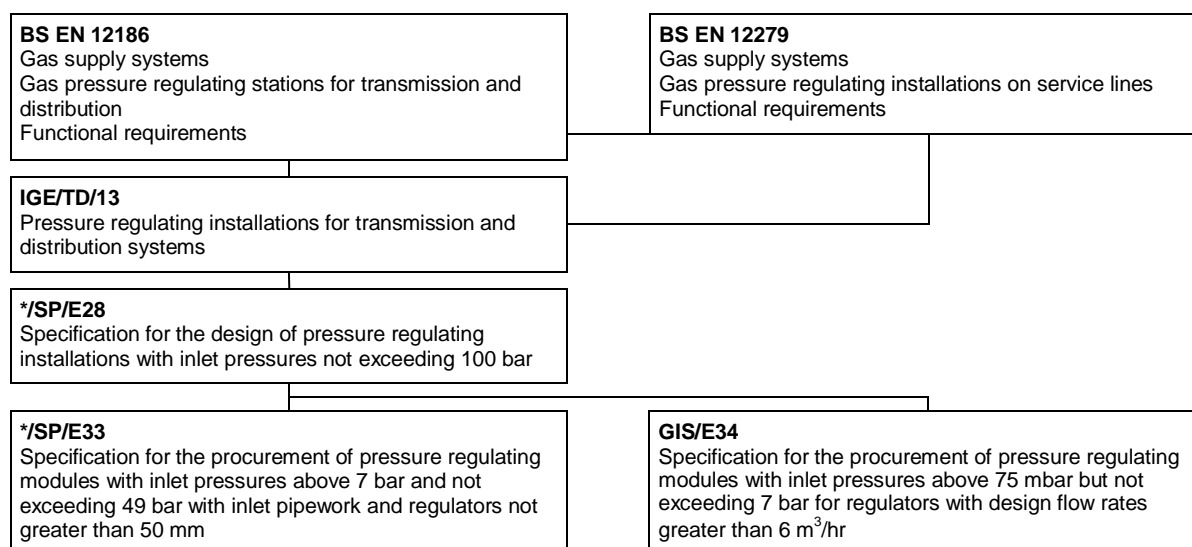
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Relationship with other publications



Mandatory and non-mandatory requirements

For the purposes of a GIS the following auxiliary verbs have the meanings indicated:

can indicates a physical possibility;

may indicates an option that is not mandatory;

shall indicates a GIS requirement;

should indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment needs to be completed to show that the alternative method delivers the same, or better, level of protection.

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Brief history

<p>First published as 94/344 Revised as 94/344 Issued as T/SP/E34 Editorial update to reflect demerger November 2000 Revised and reissued as T/SP/E34 to reflect adoption of IGE/TD/13 Editorial update to correct errors in conversion to PDF Minor amendment Section 6.1.3 and 23.2 Editorial Update to comply with GRM Edited by BSI in accordance with BS 0-3:1997 Editorial Update to allowable noise levels in order to align with the Control of Noise at Work Regulations 2005 Normative references updated and additional minor details clarified</p>	<p>September 1994 March 1995 December 2000 June 2001 February 2004 June 2004 July 2004 October 2004 July 2006 Sept 2007 July 2015</p>
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1 Scope

This Gas Industry Standard (GIS) specifies the requirements for the design and construction of pre-assembled, single or multiple stream, regulator modules operating with inlet pressures of either:

- a) above 75 mbar and not greater than 2 bar;
- b) above 2 bar but not greater than 7 bar.

Installations within the scope of this GIS include:

- 1) pressure regulating modules, supplying low and medium pressure networks from medium or intermediate pressure networks;
- 2) industrial/commercial pressure regulating modules in pipes and services supplying industrial/commercial premises from medium or intermediate pressure networks, but not including any gas supply meter module;
- 3) service regulator modules with a design capacity less than 200 m³/hr supplying individual industrial/commercial or up to two domestic customers.

This GIS applies to above and below ground modules.

This GIS does not apply to the following modules:

- 1) gas supply meter modules incorporating pressure control and regulating equipment that conform to **/SP/M7*;
- 2) gas supply meter modules incorporating pressure control and regulating equipment with design flow rates less than 6 m³/hr that conform to *IGEM/PRS/28* and *IGEM/PRS/29*.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Formal standards

API 5L, *Specification for line pipe*.

ASTM A269, *Specification for seamless and welded austenitic stainless steel tubing for general service*.

BS EN 331, *Manually operated ball valves and closed bottom taper plug valves for gas installations in buildings*.

BS EN 334, *Gas pressure regulators for inlet pressures up to 100 bar*.

BS EN 485 Series, *Aluminium and aluminium alloys, sheet, strip and plate*.

BS EN 515, *Aluminium and aluminium alloys — Wrought products — Temper designations*.

BS EN 573 Series, *Aluminium and aluminium alloys — Chemical composition & form of wrought products*.

BS EN 751 Series, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water*.

BS EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*.

BS EN 1092-2, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges*.

BS EN 1092-4, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 4: Aluminium flanges.*

BS EN 1514-1, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Non-metallic flat gaskets with or without inserts.*

BS EN 1515-1, *Flanges and their joints — Bolting — Selection of bolting.*

BS EN 1561, *Founding — Grey cast irons.*

BS EN 1563, *Founding — Spheroidal graphite cast iron.*

BS EN 10213 series, *Technical delivery conditions for steel castings for pressure purposes.*

BS EN 10216-1, *Seamless steel tubes for pressure purposes — Part 1: Technical delivery conditions.*

BS EN 10216-5, *Seamless steel tubes for pressure purposes — Part 5: Stainless steel tubes.*

BS EN 10217-1, *Welded steel tubes for pressure purposes — Technical delivery conditions — Non-alloy steel tubes with specified room temperature properties.*

BS EN 10222 Series, *Steel forgings for pressure purposes — General requirements for open die forgings.*

BS EN 10241, *Steel threaded pipe fittings.*

BS EN 10253-1, *Butt-welding pipe fittings — Wrought carbon steel for general use and without specific inspection requirements.*

BS EN 13774, *Valves for gas distribution systems with maximum operating pressure less than or equal to 16 bar — Performance requirements.*

BS 10, *Specification for flanges and bolting for pipes, valves and fittings.*

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions).*

BS 1387, *Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads.*

BS 1560, *Circular flanges for pipes, valves and fittings (class designated).*

BS 1640, *Specification for steel butt-welding pipe fittings for the petroleum industry.*

BS 1965-1, *Specification for butt-welding pipe fittings for pressure purposes — Carbon steel.*

BS 2971, *Specification for Class II arc welding of carbon steel pipework for carrying fluids.*

BS 3974, *Specification for pipe supports.*

BS 3799, *Specification for steel pipe fittings, screwed and socket-welding for the petroleum industries.*

BS 4800, *Schedule of paint colours for building purposes.*

BS 6739, *Code of practice for instrumentation in process control systems: installation design and practice.*

Gas Industry Standards

GIS/E13.1, *Specification for gas filters (80 mm nominal size and above) suitable for use in the pressure range above 75 mbar and not exceeding 7 bar.*

GIS/F7, *Specification for steel welding pipe fittings 15 mm to 450 mm inclusive nominal size for operating pressures not greater than 7 bar.*

GIS/F9-1, *Specification for metric and imperial carbon and stainless steel single ferrule compression fittings for tubes — Part 1: General requirements.*

GIS/F9-2, *Specification for metric and imperial carbon and stainless steel single ferrule compression fittings for tubes — Part 2: Evaluation procedure.*

GIS/V9-1, *Specification for slamshut valves for governor installations with inlet pressures in the range greater than 75 mbar to not greater than 7 bar — Part 1: Spring-operated diaphragm type slamshut valves.*

Institution of Gas Engineers & Managers Standards

IGEM/PRS/28, *Medium pressure single-stage regulators for gas flow rates not exceeding 6m³/hr.*

IGEM/PRS/29, *Medium pressure two-stage meter regulators for gas flow rates not exceeding 6m³/hr.*

IGE/SR/25, *Hazardous Area Classification of Natural Gas installations.*

IGE/TD13, *Pressure regulating installations for transmission and distribution.*

Gas Distribution Network standards

*/SP/CE4, *Specification for the design, construction and testing of civil and structural works — Steelwork.*

*/SP/CE10, *Specification for the design, construction and testing of civil and structural works — equipment enclosures and pit covers.*

*/SP/CW/6 Part 1, *Specification for the external protection of steel line pipe and fittings using fusion bonded powder and other coating systems Part 1 - Requirements for coating material and methods of test*

*/SP/CW/6 Part 2 *Specification for the external protection of steel line pipe and fittings using fusion bonded powder and other coating systems. Part 2 - Factory applied coatings*

*/SP/E28, *Specification for the design of pressure regulating installations with inlet pressures not exceeding 100 bar.*

*/SP/M7, *Requirements for industrial and commercial metering installations (inlet pressures not exceeding 7 bar gauge).*

*/SP/P1, *Specification for welding of steel pipe operating at pressures not greater than 7 bar.*

*/SP/PA/9, *Specification for paint systems - properties and performance requirements.*

*/SP/PA10, *Technical specification for new and maintenance painting at works and site for above ground pipeline and plant installations.*

Where * denotes each gas distribution network reference.

3 Terms and definitions

3.1

auxiliary system

control system, usually limited to low control pressures, superimposed on a main **regulator** to enhance the accuracy of its performance or introduce additional functions (e.g. automatic pressure change, volume control)

NOTE An auxiliary system comprises a small bore piping arrangement, connected between the upstream and downstream pipework of the main regulator to use the differential pressure as a power source, and incorporating auxiliary regulators (see '**J**' pilot and '**K**' pilot) and appropriate control connections to the main regulator according to the functions required.

3.2

closed at rest regulator

regulator in which the internal flow control element(s) is designed to be in the closed position when all control and sensing connections are removed

3.3

component

specific device or item of equipment contained within a stream or module, e.g. **regulator**, **slamshut valve**, filter

3.4

creep <of gas control equipment>

minor leakage volume of gas, which a **regulator** or other control unit might be unable to contain in its nominally closed state

3.5

demand-activated governing

pressure governing **module** designed to automatically adjust its set point within predetermined limits according to variations in demand

3.6

design pressure

maximum working pressure for a specific group of **modules**

3.7

impulse

pressure sensed by the **regulator** and **slamshut valve**

3.8

integral pressure relief

safety valve that opens at a prescribed pressure, constructed in such a way that all its working parts are housed within the main casing or body of a **regulator**

3.9

intermediate pressure (IP)

gas pressure exceeding 2 bar but not exceeding 7 bar

3.10

'J' pilot

auxiliary pilot that uses the pressure energy in the supply main to provide an auxiliary flow of gas at a conveniently reduced pressure level to power the control system of the main **regulator**

NOTE This is a historical term generally used in the gas industry.

3.11

'K' pilot

outlet pressure auxiliary or pilot **regulator** incorporated in the control system of a main pressure **regulator**, to exert fine control of the outlet pressure by sensing downstream pressure and correspondingly modulating the auxiliary flow of gas controlling the main **regulator**

NOTE This is a historical term generally used in the gas industry.

3.12

lock-up pressure

outlet pressure at which a **regulator** shuts off completely

3.13**low pressure (LP)**

gas pressure not exceeding 75 mbar

3.14**maximum operating pressure (MOP)**

maximum pressure at which a system can be operated continuously under normal operating conditions

3.15**medium pressure (MP)**

gas pressure exceeding 75 mbar but not exceeding 2 bar

3.16**module**

complete module including all components, e.g. **regulator(s)**, valves, protective devices, filters, connecting pipework, control system

NOTE Also referred to as regulator module, regulating module.

3.17**monitor/active configuration**

arrangement of two **regulators** in series whose pressure settings are stepped to allow one regulator (active) to control the outlet pressure under normal operation and the other **regulator** (monitor) to assume control in the event of failure of the active unit to the open position

NOTE Also referred to as monitor/active regulation.

3.18**non-critical auxiliary pipework**

auxiliary pipework that, if fractured or severed, would not result in the outlet pressure of the module rising to an unsafe level

3.19**open at rest regulator**

regulator in which the internal flow control element(s) is designed to be in the open position when all control and sensing connections are removed

3.20**pilot control**

subsidiary regulating mechanism that generally uses the pressure upstream of the final control element or other control unit (e.g. **regulator**, **slamshut valve**) as a power source to exert control over that element

3.21**pressure relief valve**

valve or **regulator** incorporated to protect a system against excessive pressure, which vents to atmosphere when a predetermined maximum pressure is attained

3.22**profile control**

electronic control system that can be programmed to vary the outlet pressure of a **regulator module** according to a predefined pressure profile

3.23

rangeability of a regulator

ratio of the maximum capacity of a **regulator** to the minimum capacity

NOTE 1 The maximum capacity can usually be obtained from the maker's catalogue, making due allowance for the specific gravity of the gas handled and the pressure recovery appropriate to the particular module.

NOTE 2 The minimum capacity is that capacity down to which the regulator is designed to maintain stable control.

3.24

regulator

individual component within a **module** whose function is to automatically control pressure or volume flow at a selected point in a gas stream

3.25

regulator capacity

maximum volume flow that a **regulator** will pass at specific inlet and outlet pressures and gas measurement conditions (for which the **regulator** is designed) whilst maintaining stable control of the flow at 15 °C and 1013.25 mbar

3.26

regulator size

nominal diameter of the **regulator** inlet connection

3.27

regulator stream

arrangement of devices and pipework (including one or more **regulators**) that control gas supply that is in either a 'working' or 'standby' mode

3.28

regulator stream design capacity

maximum volume flow that a **regulator stream** is designed to pass at specific given inlet and outlet pressures and gas measurement conditions whilst maintaining stable control of the flow at 15 °C and 1013.25 mbar

3.29

regulator stream fault capacity

peak volume flow passed by a **regulator stream** if the main control **regulator** in the stream fails in the open position at design maximum inlet pressure

3.30

set point

value of the controlled parameter (whether upstream or downstream pressure or flow rate) that a **regulator** or other control device is set to maintain

3.31

slamshut valve

valve arranged to close quickly in the event that it detects an abnormal downstream pressure, usually excess pressure

3.32

stream discrimination

system situated in each stream to shield that stream's **slamshut valve** from spurious tripping so as to ensure that only a faulty **regulator stream** is shut down

3.33**tappings**

provision for connecting **module** to pipework for the purposes of impulse connection, pressure points and other similar purposes

3.34**test pressure**

pressure to which components or complete **modules** are subjected for acceptance purposes

3.35**valve position indicator**

device incorporated in a **regulator** to show valve movement from the closed position

4 General requirements**4.1 General**

4.1.1 The module's design and components shall be in accordance with IGE/TD13 and */SP/E28.

4.1.2 The module shall be designed for operation in ambient temperatures from -20 °C to 60 °C.

4.1.3 The module shall be suitable for operation out of doors.

4.1.4 Each component within the module shall be easily and safely removable on site.

4.1.5 Where a module contains more than one stream, each stream shall have identical components.

4.2 Size

The module shall be constructed to be as compact as possible whilst still allowing safe handling and maintenance, satisfactory operation, ease of access to the spring adjusters of pilots, regulators and slamshut valves, and other requirements of this standard.

4.3 Marking

4.3.1 Each component shall have a label of corrosion resistant material securely fastened to it in a clearly visible position.

4.3.2 The label shall include, as minimum, information on the following:

- a) unique identification number;
- b) size;
- c) type;
- d) spring range;
- e) maximum operating pressure;
- f) test pressure.

4.3.3 Completed modules conforming to GIS/E34 shall have a label of corrosion resistant material permanently attached to an easily observed part of the unit.

4.3.4 The label shall include, as a minimum, the following information:

- a) the number and date of this standard, (i.e. GIS/E34:2015¹);
- b) the name or trademark of the manufacturer or their appointed agent;

- c) the manufacturer's contact details;
- d) where authorized, the product conformity mark of a third party certification body, e.g. BSI Kitemark.

NOTE Attention is drawn to the advantages of using third party certification of conformance to a standard.

- e) a unique reference number;
- f) maximum operating pressure (inlet and outlet);
- g) design pressure;
- h) test pressure (inlet and outlet);
- i) date of manufacture;
- j) design capacity at design pressure;
- k) total weight.

4.3.5 The required flow direction shall be clearly and permanently marked on equipment whose performance relies on its correct orientation.

4.4 Lifting and support

4.4.1 Tapped holes and eyebolts shall not be used for lifting purposes. Sufficient lifting lugs shall be fitted to enable the module to be lifted by at least two hooks.

4.4.2 The eye of the lifting lug shall be painted red.

4.4.3 Above ground modules shall be freestanding and provided with adequate supports for fixing to a base.

4.4.4 The supports shall be designed to conform to */SP/CE4.

4.4.5 Supports shall not be welded to the module pipework, flanges or equipment.

4.4.6 Pipework shall be wrapped at contact points with supports.

4.4.7 Insulation shall be provided between pipework and supports.

¹⁾ Marking GIS/E34:2015 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

4.5 Noise

4.5.1 When designing the modules, consideration shall be given to possible noise emission at all flow and pressure conditions.

NOTE This is particularly applicable to intermediate pressure units.

4.5.2 The manufacturer shall supply details of noise levels over the full range of working conditions at a distance of 1 m from the module.

4.5.3 Noise levels at a distance of 1 m from the module must not exceed the daily or weekly average exposure level of 85 dBA.

4.6 Gas velocity

Gas velocities shall not exceed 20 m/s for unfiltered gas in the inlet pipework and 40 m/s for filtered gas at the module outlet flange.

4.7 Flange connection

Inlet and outlet flanges shall terminate with a BS EN 1092-1 PN 16 flange, to permit the tie in to inlet and outlet flanges on the distribution main. Orientation of the inlet flange shall be specified on the enquiry form for regulator modules given in Annex A.

4.8 Painting

4.8.1 Above ground modules shall be prepared and painted in accordance with */SP/PA10 and finished in conformance to BS 4800, colour 10 E53 (canary yellow).

4.8.2 Buried modules shall be prepared and painted in accordance with */SP/CW/6 Parts 1 & 2.

4.8.3 Stainless steel pipework and fittings incorporated into modules need not be painted. Where stainless steel pipework and fittings are painted, it shall be in accordance with sections 5.8 and SPA6 of */SP/PA10.

4.8.4 Following painting, spaces between all flanges shall be protected against corrosion following a procedure previously agreed by the gas transporter.

4.9 Documentation

For each type of module the following shall be provided:

- a) Certification of compliance with this Specification and documentation such as weld acceptance certification, material certification, noise predictions and test records sufficient to demonstrate compliance with the Pressure Systems Safety Regulations 2000;
- b) Certification that the module has undergone a pre-delivery functional test. The certificate must include details of the settings of the components;
- c) detailed commissioning, operation, maintenance and inspection instructions in English;
- d) a full set of detailed drawings;
- e) a set of performance curves over the full capacity range of the module at the pressures specified by the gas transporter in its purchase order;
- f) Documentation must be provided on or before the agreed delivery date.

4.10 Delivery

All open ends of components shall be adequately sealed and sufficiently robust to withstand damage and to prevent ingress of water or foreign matter during delivery or storage.

5 Construction of modules

5.1 General

NOTE 1 The gas transporter will specify the control accuracy required for each module on the enquiry form for regulator modules given in Annex A.

NOTE 2 The fabrication assembly, testing and painting of each module might be subject to the gas transporter's Quality Assurance inspection or a monitored agreement.

5.1.1 Modules in arrangement Groups 1 to 5 (see **5.2** to **5.4**) shall be designed, where auxiliary control systems exist, with sufficient tapplings to accommodate the systems and impulse pipework detailed in Figures 1 to 6. On single stream units, there shall also be a valved inlet and outlet tapping for the connection of a temporary governed rider for maintenance purposes.

5.1.2 On modules with inlet pressures above 2 bar, all pipework up to and including the inlet connection of the stream inlet isolation valve(s) shall be of welded construction.

5.1.3 Monitor/active modules shall be installed as close together as the equipment allows.

5.1.4 On twin stream modules, each stream shall be capable of supplying the specified design capacity at the minimum design inlet pressure and maximum design outlet pressure.

5.1.5 Covers for buried modules shall conform to */SP/CE10.

5.1.6 Below ground housing ventilation shall conform to IGE/SR25.

5.2 Inlet pressure 75 mbar to 2 bar with regulator design flow rates greater than 200 m³/hr

5.2.1 Modules shall comprise one or more streams; each stream shall contain equipment from either Group 1 or 2 arrangements.

NOTE Typical arrangements are shown in Figure 1 and Figure 2.

a) Group 1: monitor regulator and active regulator arrangement:

- 1) inlet and outlet stream isolation valves;
- 2) main stream filter;
- 3) monitor regulator;
- 4) active regulator;
- 5) creep relief valve (optional).

b) Group 2: slamshut valve and active regulator arrangement:

- 1) inlet and outlet stream isolation valves;
- 2) main stream filter;
- 3) slamshut valve;
- 4) active regulator;
- 5) stream discrimination system (optional on single stream units);
- 6) creep relief valve.

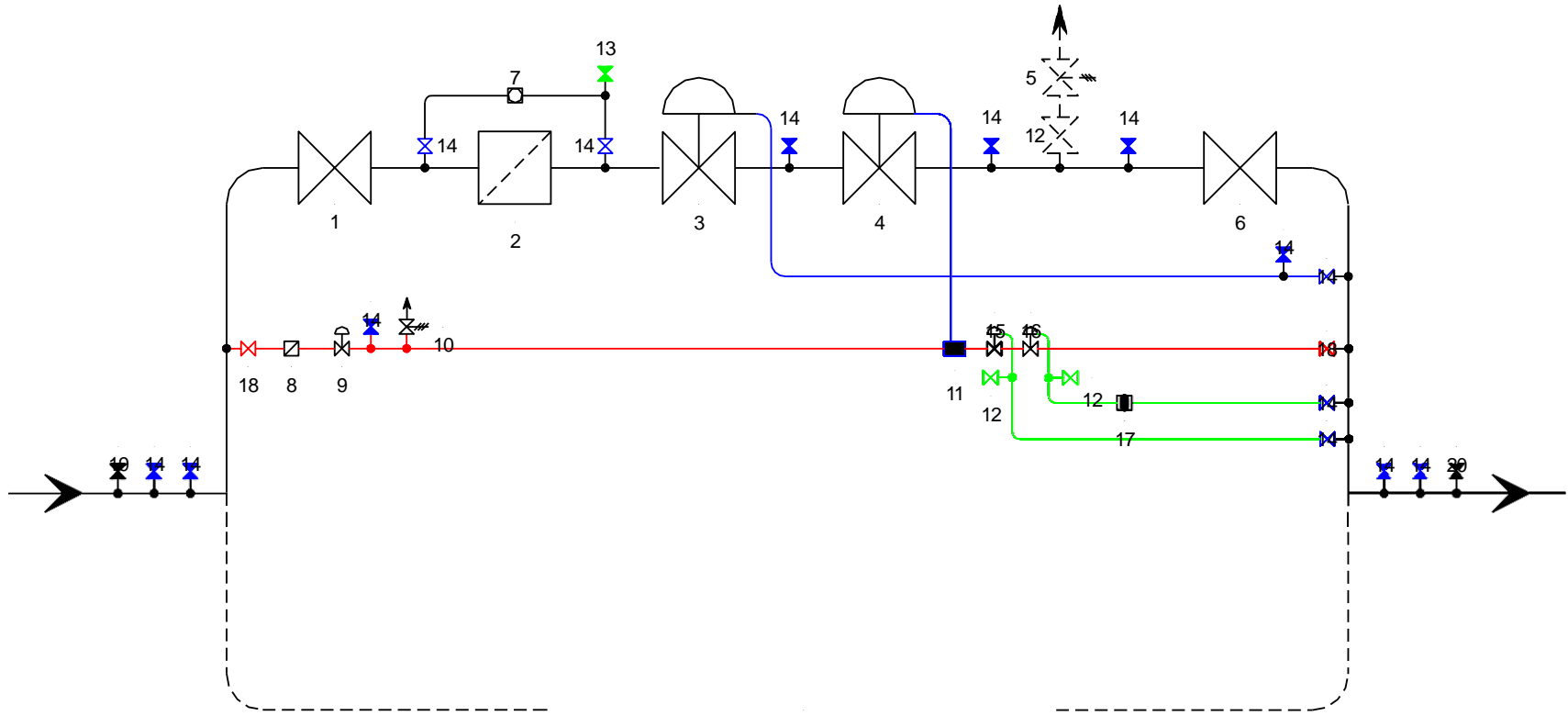
5.2.2 Group 1 and 2 regulators shall have internal flow control elements that are open at rest.

5.2.3 Pilot operated regulators that use a rubber diaphragm device as the valve element and open automatically at low inlet and outlet pressure differentials may be used in this application if approved by the gas transporter.

5.2.4 For Group 1 arrangements the monitor regulator shall be upstream of the active regulator.

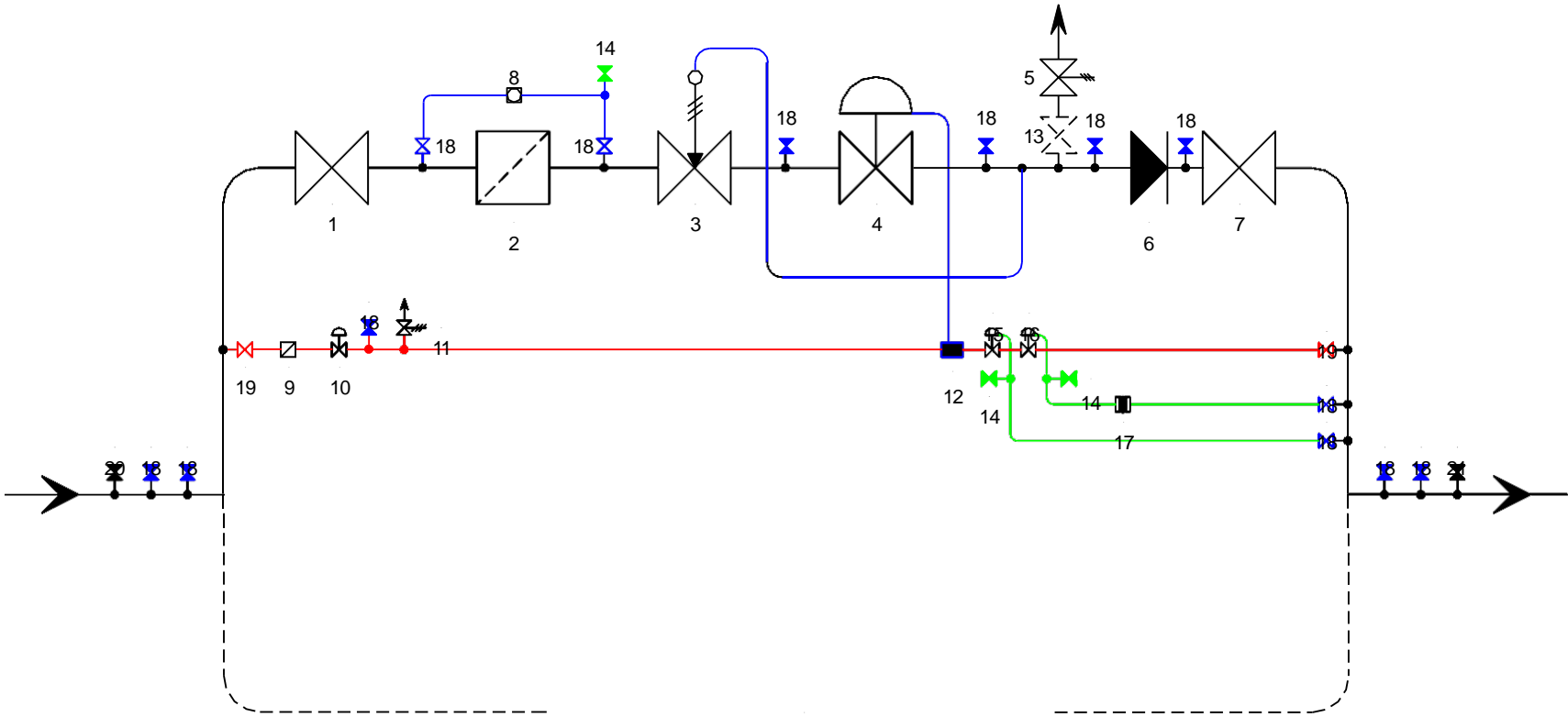
5.2.5 For Group 1 arrangements the monitor regulator's speed of response when closing shall be the same or faster than the speed of response of the active regulator when opening.

Figure 1 —Typical Group 1 monitor regulator and active regulator configuration with auxiliary control system for inlet pressure regulator above 75 mbar up to 2 bar



DUPLICATE STREAM(S) WHERE APPLICABLE

- | | | | | | |
|---|--------------------------------|----|---|----|---|
| 1 | Inlet Stream Isolation Valve | 8 | Auxiliary Filter | 15 | } Pneumatic/Electronic outlet pressure control system (Where Specified) |
| 2 | Main Filter | 9 | Auxiliary Power Pilot | 16 | |
| 3 | Monitor Regulator | 10 | Auxiliary Relief Valve | 17 | |
| 4 | Active Regulator | 11 | Inspirator or Needle Valve | 18 | Valve 20 mm (3/4") |
| 5 | Stream Creep Relief (Optional) | 12 | Creep Relief Maintenance Valve (Optional) | 19 | Valve 25 mm (1") (Single Stream Only) |
| 6 | Outlet Stream Isolation Valve | 13 | Valve 6 mm (1/4") | 20 | Valve 50 mm (2") (Single Stream Only) |
| 7 | Filter Differential Gauge | 14 | Valve 15 mm (1/2") | | |



DUPLICATE STREAM(S) WHERE APPLICABLE

- | | | | | | |
|---|-------------------------------------|----|---|----|---|
| 1 | Inlet Stream Isolation Valve | 8 | Filter Differential Gauge | 15 | } Pneumatic/Electronic outlet pressure control system (Where Specified) |
| 2 | Main Filter | 9 | Auxiliary Filter | 16 | |
| 3 | Slamshtut Valve | 10 | Auxiliary Power Pilot | 17 | |
| 4 | Active Regulator | 11 | Auxiliary Relief Valve | 18 | Valve 15 mm (1/2") |
| 5 | Stream Creep Relief | 12 | Inspirator or Needle Valve | 19 | Valve 20 mm (3/4") |
| 6 | Non-Return Valve (Where Applicable) | 13 | Creep Relief Maintenance Valve (Optional) | 20 | Valve 25 mm (1") (Single Stream Only) |
| 7 | Outlet Stream Isolation Valve | 14 | Valve 6 mm (1/4") | 21 | Valve 50 mm (2") (Single Stream Only) |

Figure 2 — Typical Group 2 slamshtut and active regulator configuration with auxiliary control system for inlet pressure above 75 mbar up to 2 bar

5.3 Inlet pressure above 2 bar to 7 bar with regulator design flow rates greater than 200 m³/hr

5.3.1 Modules shall comprise one or more streams; each stream shall contain equipment from either Group 3 or 4 arrangements.

NOTE A typical arrangement is shown in Figure 3.

a) Group 3 (MP outlet): slamshut valve, monitor regulator and active regulator arrangement:

- 1) inlet and outlet stream isolation valves;
- 2) main stream filter;
- 3) slamshut valve;
- 4) monitor regulator;
- 5) active regulator;
- 6) stream discrimination system (optional on single stream units);
- 7) creep relief valve.

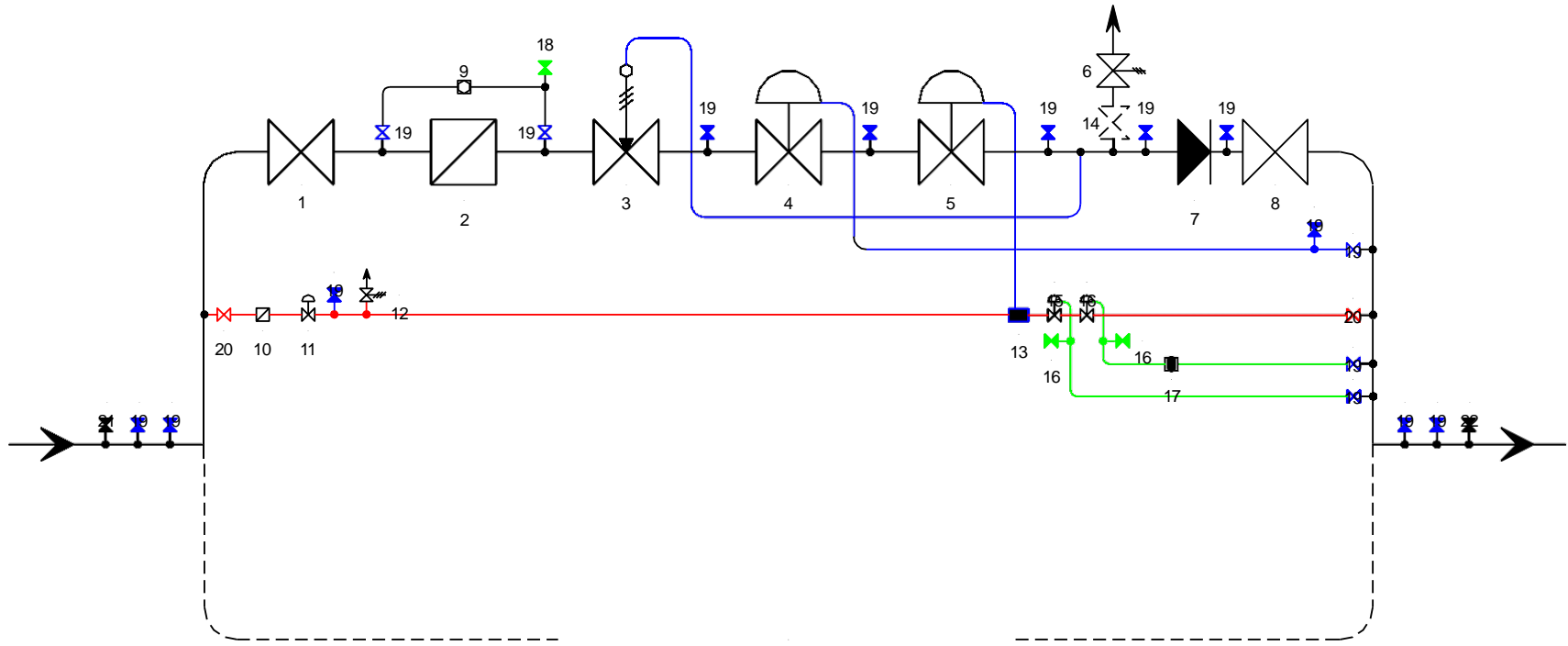
b) Group 4 (LP outlet): slamshut valve, monitor regulator and active regulator arrangement:

- 1) inlet and outlet stream isolation valves;
- 2) main stream filter;
- 3) slamshut valve;
- 4) monitor regulator;
- 5) active regulator;
- 6) stream discrimination system (optional on single stream units);
- 7) creep relief valve.

5.3.2 The monitor regulator shall be upstream of the active regulator.

5.3.3 The monitor regulator's speed of response when closing shall be the same or faster than the speed of response of the active regulator when opening.

5.3.4 Group 3 and 4 regulators may have internal flow control elements that are either open or closed at rest.



DUPLICATE STREAM(S) WHERE APPLICABLE

- | | | | | | |
|---|-------------------------------------|----|---|----|---|
| 1 | Inlet Stream Isolation Valve | 8 | Outlet Stream Isolation Valve | 15 | } Pneumatic/Electronic outlet pressure control system (Where Specified) |
| 2 | Main Filter | 9 | Filter Differential Gauge | 16 | |
| 3 | Slamshut Valve | 10 | Auxiliary Filter | 17 | |
| 4 | Monitor Regulator | 11 | Auxiliary Power Pilot | 18 | Valve 6 mm (1/4") |
| 5 | Active Regulator | 12 | Auxiliary Relief Valve | 19 | Valve 15 mm (1/2") |
| 6 | Stream Creep Relief | 13 | Inspirator or Needle Valve | 20 | Valve 20 mm (3/4") |
| 7 | Non Return Valve (Where Applicable) | 14 | Creep Relief Maintenance Valve (Optional) | 21 | Valve 25 mm (1") (Single Stream Only) |
| | | | | 22 | Valve 50 mm (2") (Single Stream Only) |

Figure 3 — Typical Group 3 or 4 slamshut, monitor regulator and active regulator configuration with auxiliary control system for inlet pressure above 2 bar up to 7 bar

5.4 Inlet pressure 75 mbar to 7 bar with regulator design flow rates greater than 6 m³/hr and equal to or less than 200 m³/hr

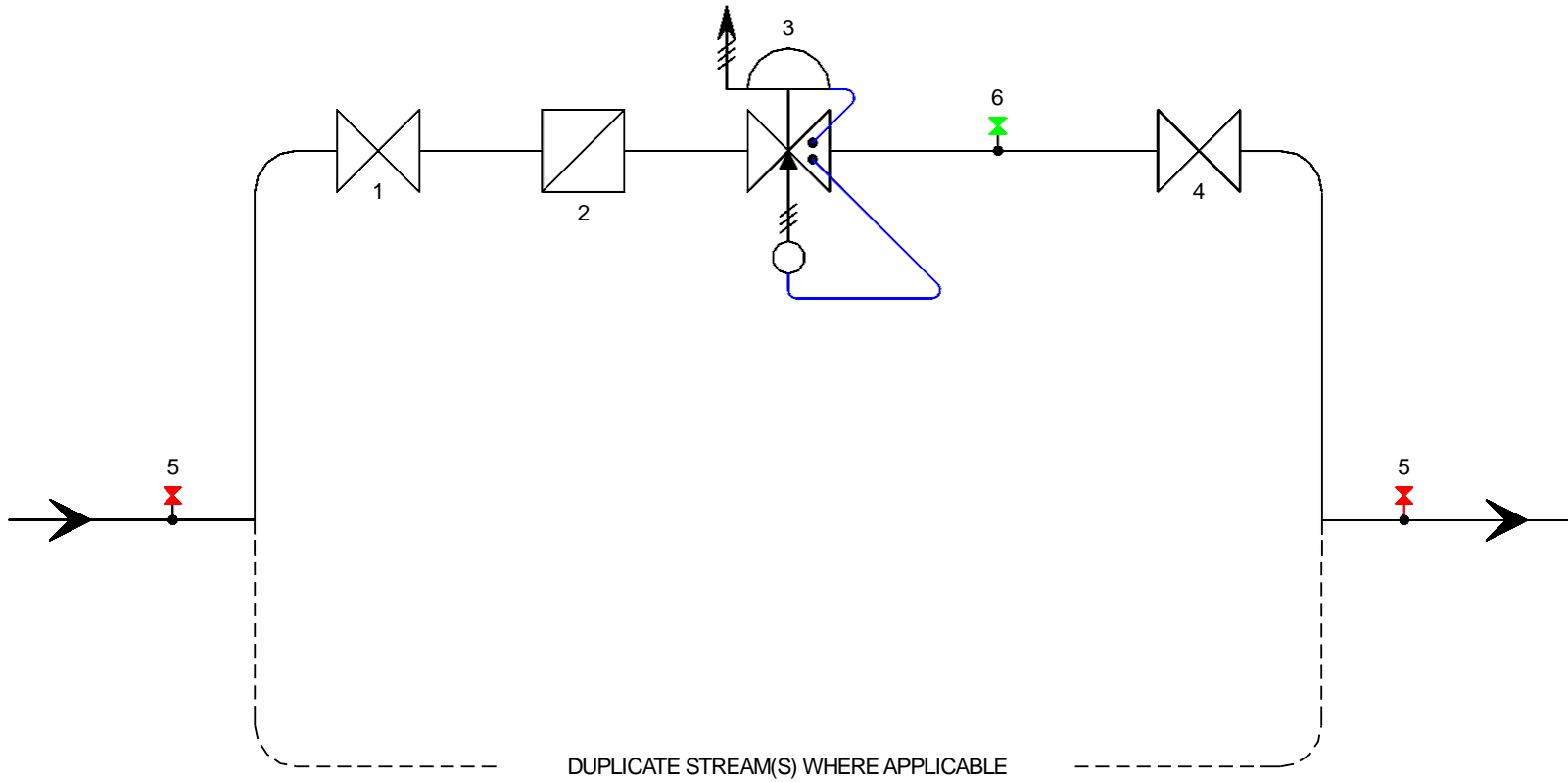
5.4.1 Modules shall comprise one or more streams; each stream shall contain equipment from the Group 5 arrangement.

NOTE Typical arrangements are shown in Figures 4, 5 and 6.

a) Group 5: slamshut valve and active regulator arrangement:

- 1) inlet and outlet stream isolation valves;
- 2) main stream filter;
- 3) slamshut valve;
- 4) active regulator;
- 5) stream discrimination system (optional);
- 6) creep relief valve.

5.4.2 Regulators within Group 5 shall have internal flow control elements that are open at rest.

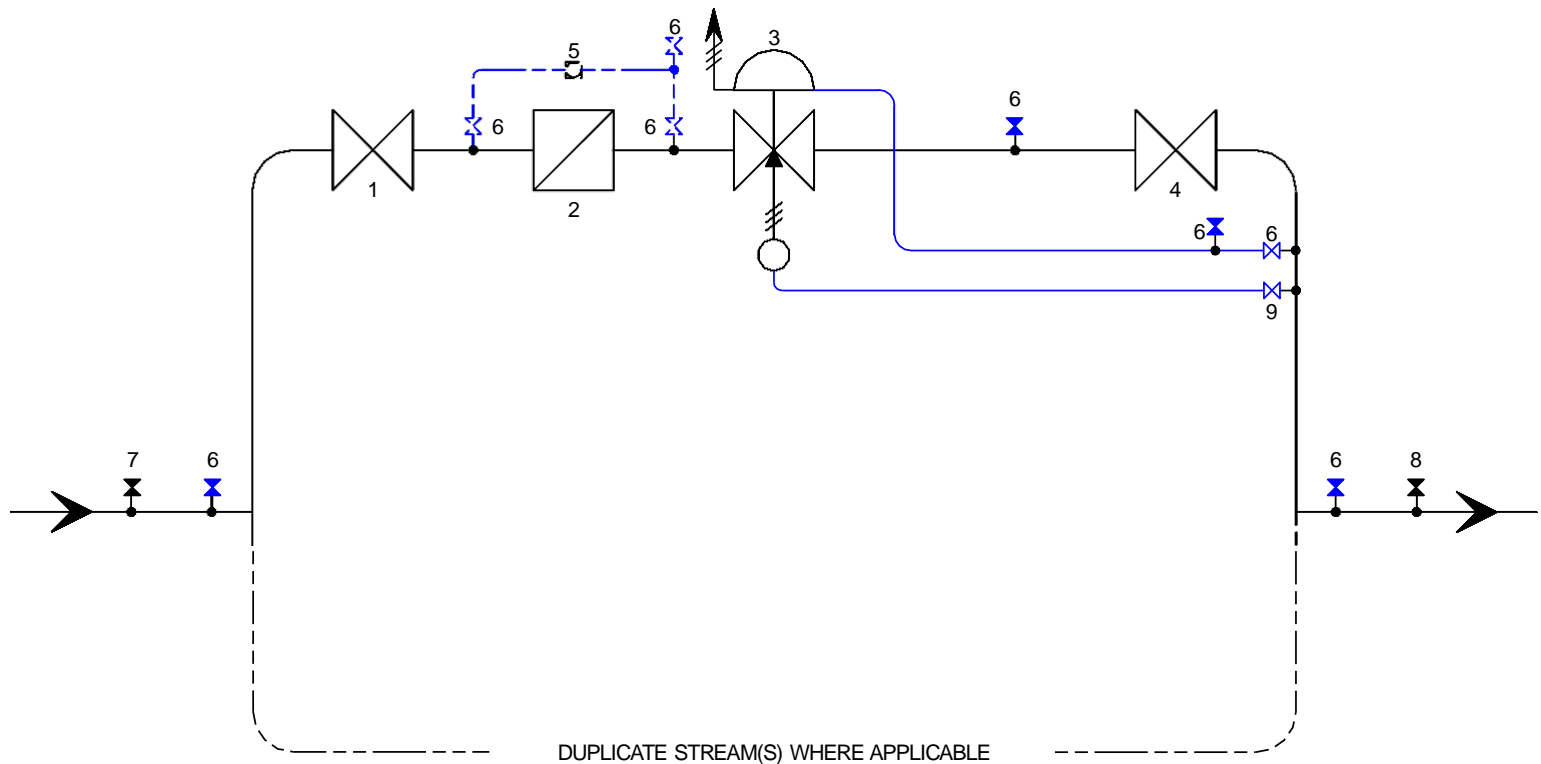


- 1 Inlet Stream Isolation Valve
- 2 Main Filter

- 3 Regulator (Integral Relief & Slamshut)
- 4 Outlet Stream Isolation Valve

- 5 Valve 20 mm (3/4") (Single Stream Only)
- 6 Valve 6 mm (1/4")

Figure 4—Typical Group 5 boundary unit with slamshut and active regulator configuration for inlet pressure above 75 mbar up to 7 bar

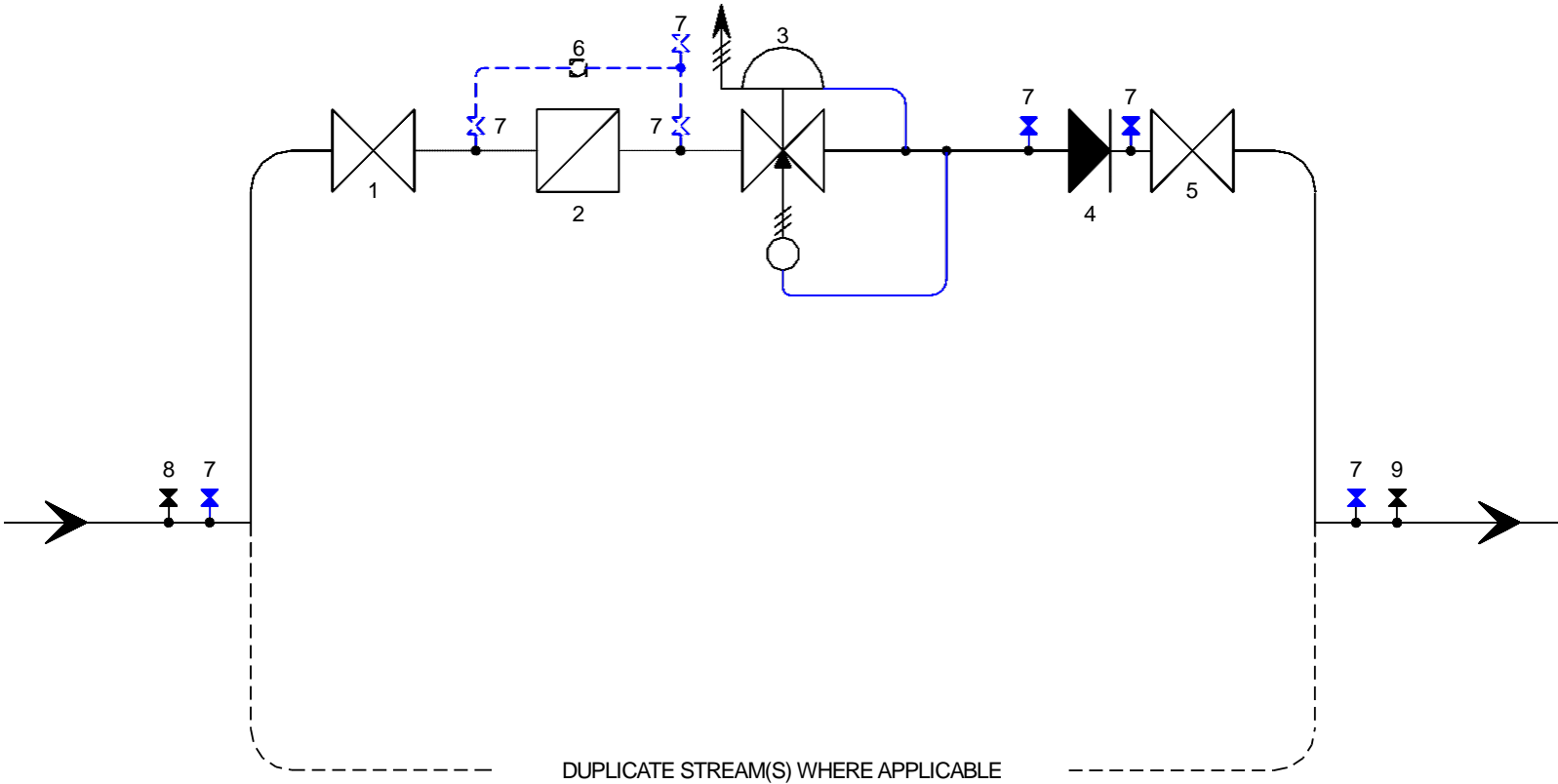


- | | | | | | |
|---|--|---|------------------------------------|---|---------------------------------------|
| 1 | Inlet Stream Isolation Valve | 4 | Outlet Stream Isolation Valve | 7 | Valve 25 mm (1") (Single Stream Only) |
| 2 | Main Filter | 5 | Filter Differential Gauge (Option) | 8 | Valve 50 mm (2") (Single Stream Only) |
| 3 | Regulator (Integral Relief & Slamshut) | 6 | Valve 15 mm (1/2") | 9 | Locked Open Valve |

Note: Regulator and Slamshut shown with external impulse but, may be internally impulsed where appropriate

NOTE Design capacity less than 200 m³/hr for inlet pressure above 75 mbar up to 7 bar.

Figure 5 —Typical Group 5 slamshut and active regulator configuration



DUPLICATE STREAM(S) WHERE APPLICABLE

- | | | | | | |
|---|--|---|------------------------------------|---|---------------------------------------|
| 1 | Inlet Stream Isolation Valve | 4 | Non-Return Valve | 7 | Valve 15 mm (1/2") |
| 2 | Main Filter | 5 | Outlet Stream Isolation Valve | 8 | Valve 25 mm (1") (Single Stream Only) |
| 3 | Regulator (Integral Relief & Slamshut) | 6 | Filter Differential Gauge (Option) | 9 | Valve 50 mm (2") (Single Stream Only) |

Note: Regulator and Slamshut shown with external impulse but, may be internally impulsed where appropriate

NOTE Design capacity less than 200 m³/hr for inlet pressure above 75 mbar up to 7 bar.

Figure 6—Typical Group 5 slamshtut and active regulator configuration with stream discrimination

6 Components

6.1 Stream isolation valves

6.1.1 Stream isolation valves shall be fitted on the inlet and outlet of each stream and shall conform to BS EN 13774.

6.1.2 The differential pressure across the valves in the open position at maximum design flow rate should not exceed the following:

- a) operating pressures up to 75 mbar: 20 mbar;
- b) operating pressures between 75 mbar and 2 bar: 50 mbar;
- c) operating pressures above 2 bar: 100 mbar.

6.1.3 Where isolation is by a single valve, of 50 mm nominal bore or greater, the valve shall be designed to seal on both the upstream and downstream faces and the space between shall be constructed with the facility for installing a vent.

6.1.4 Plugged valves shall be fitted to body vents.

6.1.5 Where isolation is by twin valves, a valved connection shall be fitted so that the space between the valves can be vented.

6.1.6 Valves shall close when the direct operating actuator is turned in a clockwise direction.

6.1.7 Valves shall carry clear indication of the direction of operation to open and close the valve.

6.1.8 Valve position indicators shall be used.

6.1.9 The stream isolation valves shall be fitted with body drains.

6.1.10 Where it is necessary to lubricate a valve for continued satisfactory operation, seals shall be provided to minimise the amount of excess lubricant passing into the gas stream.

6.1.11 Where the valve incorporates a ball, the valve shall be constructed so that the ball cannot be released by unscrewing any part of the body.

6.1.12 Valves shall be supplied without operators (e.g. handwheels, levers). Operators shall be available as an option.

6.1.13 Valves may be lever operated up to 150 mm. Larger valves shall be operated by a handwheel.

6.1.14 The stream isolation valves should be fitted such that the module is compact, but allowance must be made for ease of operation, maintenance and removal.

6.2 Filters

6.2.1 There shall be a filter in each main stream that conforms to GIS/E32.

6.2.2 Filters shall be fitted on the inlet of the stream and on the auxiliary streams.

6.2.3 Filters for main regulators shall have cut off levels as indicated in Table 1.

Table 1 — Filtration cut off levels for main regulators

Operating pressure	Filtration cut off level
75 mbar to 2 bar	≤ 200 micron
Above 2 bar	≤ 50 micron

6.2.4 Filters for gas supplies to pilots and auxiliaries shall have cut off levels as indicated in Table 2.

Table 2 — Filtration cut off levels for gas supplies to pilots and auxiliaries

Operating pressure	Pilot orifice diameter	Filtration cut off level
Up to 7 bar	≥ 3.2 mm (1/8")	≤ 50 micron
Up to 7 bar	< 3.2 mm (1/8")	≤ 10 micron

6.2.5 Main line filters of 50 mm nominal bore and greater shall incorporate the following elements:

- a) a connection of adequate size, with plugged valve for draining, venting or purging prior to changing elements;
- b) provision for a valved differential pressure gauge;
- c) a size that gives minimal pressure drop across a clean filter at maximum design flow; acceptable pressure drops are given in Table 3.

Table 3 — Maximum differential pressure across clean filters

Operating pressure	Differential pressure
Up to 2 bar	≤ 20 mbar
Above 2 bar	≤ 100 mbar

6.2.6 Auxiliary line filters shall allow removal of the element without disconnection of the pipework.

NOTE The orientation of the filter inlet and outlet connections is at the discretion of the manufacturer.

6.2.7 The configuration or design of the filter shall not allow debris to fall back into the inlet pipework when removing the element.

6.2.8 The direction of flow must be clearly identified

6.3 Slamshuts

6.3.1 Slamshut systems shall conform to GIS/V9-1.

6.3.2 The impulse tapping shall be dedicated for the use of the slamshut.

6.3.3 There shall be no valves incorporated in slamshut impulse lines, except where the slamshut is impulsed from the common outlet manifold; in this case it shall prevent the slamshut impulse from being isolated while the stream is operational, e.g. a locked open valve or, on slamshut control cabinets, an interlock mechanism.

6.3.4 Where a non-return valve stream discrimination device is fitted, the impulse point shall be taken from a point on the outlet pipework, upstream of the device.

6.3.5 The impulse tapping shall be positioned at a point on the outlet pipework that accurately reflects downstream pressures to the slamshut unit for all design and potential fault flow and pressure conditions.

6.3.6 The set point of the slamshut valve on low pressure networks shall not exceed 200 mbar.

NOTE The set point of the slamshut valve will be specified by the gas transporter on the enquiry form for regulator modules, of which an example is given in Annex A.

6.4 Regulators

6.4.1 Regulators included in modules shall conform to BS EN 334.

6.4.2 Regulator flanges shall conform to the dimensions specified in BS EN 1902-1 PN 16.

6.4.3 The direction of flow for which the regulator is intended shall be cast or similarly indelibly marked on the body.

6.4.4 Breathers shall be resistant to water ingress and arranged so that a screwed connection for a vent pipe can be fitted.

6.4.5 Any lubricant employed shall be compatible with the materials used in the construction of the regulator.

6.4.6 All elastomeric and polymeric components regularly subject to a gas environment, including seals and gaskets, shall be of materials suitable for use with natural gas; they shall not be adversely affected by any constituents or additives (e.g. methanol, glycol, kerosene, distillate).

6.4.7 Main diaphragm assemblies shall be designed so that the normal maximum working pressure differential rating of the diaphragm cannot be exceeded.

NOTE The burst pressure of a diaphragm should be at least three times the maximum working differential pressure.

6.4.8 All springs supplied as part of the regulator shall be marked or coloured to enable identification of pressure range.

6.5 Stream discrimination

6.5.1 All multiple stream modules (except those of a Group 5 arrangement (see 5.4.1) with slamshut protection shall have a stream discrimination system fitted as standard. This shall be available as an option on single stream units.

6.5.2 The stream discrimination device may be a non-return valve fitted between the regulator outlet and the stream outlet isolation valve or any other stream discrimination system approved by the gas transporter.

6.5.3 Where a non-return valve stream discrimination device is fitted, **6.5.3.1** to **6.5.3.8** shall apply.

6.5.3.1 On modules with outlet pressures below 75 mbar the outlet pipework shall be designed to ensure that the pressure at the slamshut valve impulse point for flowrates up to $1.5 \times$ installation maximum design flowrate for the network (Q_{max}) (see Figure 7) does not rise above the following:

- a) 30 mbar above the regulator outlet pressure (P_o);

b) 10 mbar below the regulator outlet (P_o).

6.5.3.2 If the pressure limits on the slamshut impulse pressure (see Figure 7) cannot be guaranteed, an alternative method of limiting the pressure, such as a flow limiting pilot or an under bowl relief, shall be employed.

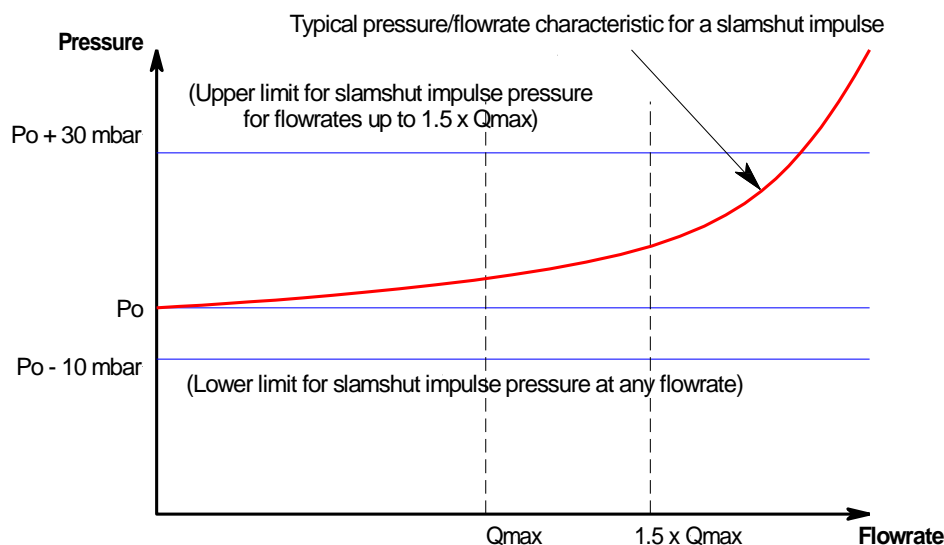


Figure 7 — Illustrating the limits on slamshut impulse pressures

6.5.3.3 On modules with outlet pressures greater than 75 mbar, the outlet pipework shall pass the maximum design flow rate specified by the gas transporter at the maximum design inlet and minimum design outlet pressure conditions, without generating a pressure high enough to cause the trip mechanism of the slamshut valve to move.

6.5.3.4 On modules with outlet pressures below 75 mbar, the outlet pipework shall be designed to pass 1.5 times the maximum design flow rate specified by the gas transporter at the maximum design inlet and minimum design outlet pressure conditions, without generating a pressure high enough to cause the trip mechanism of the slamshut valve to move.

6.5.3.5 The non-return valve shall be installed in horizontal pipework and have a minimum of one pipe diameter of straight pipe immediately upstream and downstream.

6.5.3.6 The non-return valve shall be positioned so that its operation is not affected by the position/size of downstream equipment, pipework or fittings.

6.5.3.7 A 12 mm valved tapping shall be provided in the stream pipework between the stream discrimination device and stream outlet isolation valve.

6.5.3.8 A creep relief valve shall be fitted upstream of the non-return valve and sized according to Table 4.

6.6 Creep relief valves

6.6.1 Where a non-return valve stream discrimination device is fitted, a creep relief valve shall be fitted upstream of the non-return valve.

6.6.2 On all other modules, creep relief valves shall be included as standard unless otherwise indicated on the enquiry form for regulator modules given in Annex A. The volume of gas released to atmosphere shall be limited to the lowest practicable level with the creep relief sized

to vent the volumes stated in Table 4.

Table 4 — Creep relief capacity

Module outlet pipework diameter (\varnothing) mm			Creep relief capacity m ³ /h
	\varnothing	≤ 25	2.5
25 <	\varnothing	≤ 50	10
50 <	\varnothing	≤ 80	15
80 <	\varnothing	≤ 100	20
100 <	\varnothing	≤ 150	25
150 <	\varnothing		30

6.6.3 For ease of maintenance, an isolation valve, capable of being locked in the open position, shall be fitted immediately upstream of the relief valve.

6.6.4 Relief valves may be either direct acting or pilot operated.

6.6.5 On modules supplying LP networks, the relief valve set point shall not exceed 40 mbar above the maximum design outlet pressure of the skid.

7 Testing

7.1 General

7.1.1 All modules shall be tested for strength, leakage and function. The strength test shall precede the leak test. The level of testing shall be as described in **7.2** to **7.5**.

7.1.2 Where lugs are of welded construction, the welds shall be subjected to non-destructive testing and the certificates included in the unit documentation.

7.2 Strength test (main pipework)

Table 5 — Strength test pressure levels

Design pressure (DP)			Strength test pressure bar	Minimum test duration min
75 mbar <	DP	≤ 2 bar	3 (pneumatic)	15
2 bar <	DP	≤ 7 bar	10.5 (hydrostatic)	30

7.2.1 Remove any equipment that can be damaged by water and has been independently tested from the line and install blind flanges or suitable make-up pieces in their place.

7.2.2 Disconnect all small bore connections (25 mm and below) and impulse lines and install suitable plugs or blank flanges.

7.2.3 Disconnect any equipment that could be damaged at the test pressure.

7.2.4 Ensure that all valves remain in the full open position.

7.2.5 Where a module receives a hydraulic test, drain and thoroughly dry the unit immediately after the test.

7.2.6 Follow the strength test by a pneumatic tightness test on the assembled unit.

7.2.7 Results

There shall be no pressure loss as indicated by calibrated pressure measurement.

7.3 Leakage test (main pipework)

7.3.1 Principle

The leakage test shall be undertaken at a pressure equal to the maximum pressure that the component will experience during normal operation. It shall include all components except those that could be damaged at the test pressure.

7.3.2 Ensure that all valves in the unit under test are in the open position and any open ends blanked off.

7.3.3 Apply the test pressure to the section under test and allow it to settle for 10 min, following this apply the tightness pressure again for a further 15 min.

7.3.4 The manufacturer shall issue a test certificate, which shall incorporate the regulator, slamshut valve and filter identification numbers, for each module.

7.3.5 Copies of test certificates for individual components shall be attached to the module test certificate.

7.4 Leakage test [small bore pipework and equipment (≤ 25 mm NB)]

7.4.1 Small bore pipework shall be subject to a leakage test (see **7.3**) only.

7.4.2 The leakage test shall be undertaken at a pressure equal to the operating pressure that the section of pipe will experience during normal operation.

7.5 Functional test

7.5.1 The functional test shall be undertaken after the leakage test.

7.5.2 The functional test shall be determined by the manufacturer, based on their standard procedures to ensure that the entire module is functioning correctly following the leakage test.

7.5.3 Tests shall be conducted on all equipment including regulators, slamshut valves, relief valves, auxiliary control systems and valves.

7.5.4 The test shall be undertaken at the midrange of the springs fitted, unless otherwise specified by the gas transporter.

8 Materials

8.1 Pipe materials

8.1.1 Pipe materials shall conform to one or more of the following:

- a) BS EN 10216-1;
- b) BS EN 10217-1; or
- c) API 5L.

8.1.2 Pipe conforming to BS 1387 (medium or heavy plain ended) may also be used except for uses at pressures in excess of 2 bar, when medium grade may not be used.

8.2 Grey cast iron

Grey cast iron shall not be used except for the bodies of components (e.g. valves, regulators). If used it shall conform to BS EN 1561 Grade EN-GJL-200 or EN-GJL-250.

8.3 Ductile iron

Components (e.g. valves, regulators) manufactured from ductile iron shall use material that conforms to BS EN 1563 Grade EN-GJS-350-22-LT or EN-GJS-400-18-LT as a minimum requirement.

8.4 Cast carbon steels

Cast steel shall conform to the BS EN 10213 Series as a minimum requirement.

8.5 Aluminium alloys

8.5.1 Aluminium shall conform to BS EN 485, BS EN 515 and BS EN 573 for plate, sheet and strip and BS EN 515 and BS EN 573 for bars and sections.

8.5.2 The magnesium content of aluminium alloys shall not exceed 6 %.

9 Impulse pipe and auxiliary pipework

9.1 Impulse and auxiliary pipework shall conform to BS 6739 and materials should conform to one of the appropriate standards given in Table 6.

Table 6 — Impulse and auxiliary pipework

	Auxiliary pipework Carbon steel	Impulse pipework Stainless steel
Pipe	BS 1387 (Heavy) BS EN 10216-1 BS EN 10217-1 API 5L	ASTM A269 - 316 or 321 BS 3605 BS EN 10216-5
Fittings	BS EN 10241 BS 1640 BS 3799	

Compression fittings		GIS/F9-1 GIS/F9-2
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9.2 Pipe wall thickness, especially of stainless steel pipe, shall be chosen to be compatible with the compression fittings to be used.

9.3 All compression fittings for use with stainless steel pipe shall be stainless steel; no carbon steel fittings shall be used.

9.4 All compression fittings shall be assembled in accordance with the manufacturer's instructions.

9.5 Auxiliary and impulse pipework shall be supported using anti-vibration supports as indicated in Table 7.

Table 7 — Piping and tubing supports

Size					Maximum distance between supports or clips in metres m
Metric tubing mm			Imperial tubing in		
	∅	≤ 10		∅ ≤ 3/8 OD	0.5
12 ≤	∅	≤ 22	1/2 OD ≤	∅ ≤ 3/4 OD	1
Metric piping			Imperial piping		
10 ≤	∅	≤ 20	3/8 NB ≤	∅ ≤ 3/4 NB	1.5
	∅	25		∅ ≤ 1 NB	2.0
40 ≤	∅	≤ 50	1 1/2 NB ≤	∅ ≤ 2 NB	3.0

9.6 The effects of vibration shall be considered when designing auxiliary control system pipework and the following factors taken into account.

- a) Where heavy components such as control pilots are included in the auxiliary and impulse pipework, careful attention shall be given to ensure they are adequately supported.
- b) Flexibility shall be incorporated into the auxiliary and impulse pipework.
- c) Formed bends shall not be used in close proximity to compression fittings.

9.7 Auxiliary and impulse lines shall be positioned to reduce the risk of mechanical damage and shall not impede access for maintenance of the module components.

9.8 The auxiliary and impulse pipework design shall allow for commissioning, testing and purging without breaking any fittings.

9.9 Copper and nylon shall only be used for non-critical applications.

10 Flanges

10.1 Flanges shall conform to BS EN 1092-1, BS EN 1092-2 and BS EN 1092-4 PN 16, except where the corresponding flange on a component does not have the same number of bolts or bolt circle. In this case, flanges conforming to BS 10 or BS 1560 may be used to match

component connections.

10.2 Gaskets for use with PN rated raised-face flanges shall conform to the dimensions given in BS EN 1514-1. Gaskets for use with other raised-face flanges shall conform to the dimensions given in BS 1560.

10.3 Gaskets containing asbestos shall not be used.

10.4 Bolting materials and dimensions shall conform to BS EN 1515-1.

11 Special forgings

Materials for special forgings shall conform to either the BS EN 10222 Series or GIS/F7. In exceptional cases the material used may be selected from the standard approved for steel flanges, BS EN 1092-1 PN 16, if approval is given by the gas transporter.

12 Fittings

12.1 Fittings shall conform to one of the following standards:

- a) BS 1640-1;
- b) BS 1640-3;
- c) BS 1965-1;
- d) BS EN 10253-1;
- e) GIS/F7.

12.2 Fabricated, cast and wrinkle bends shall not be used.

13 Screwed pipework and fittings

13.1 Pipe shall conform to BS 1387 (medium or heavy). Pipe conforming to BS 1387 (medium) shall not be used at pressures in excess of 2 bar.

13.2 Screwed pipe and fittings shall not be used for main inlet pipework upstream of the stream inlet isolation valve(s), on modules with inlet pressures above 2 bar.

13.3 Fittings shall conform to BS EN 10241.

13.4 Screwed connections may be used up to the limits in Table 8.

Table 8 — Limitation on the use of screwed connections

Operating pressure (OP)	Nominal bore (NB)
75 mbar < OP ≤ 2 bar	≤ 50 mm NB
2 bar < OP ≤ 7 bar	< 50 mm NB

13.5 Threads shall conform to BS 21.

13.6 Joints shall be sealed with an approved jointing material conforming to BS EN 751.

13.7 Joints shall not be turned back for alignment purposes, but dismantled and re-made.

13.8 All test and purge points, vents and drains shall be fitted with plugged valves.

14 Welding

14.1 Welding shall be carried out in conformance to **/SP/P1*, BS 2971 or an equivalent standard.

14.2 Following pipework fabrication, all welding slag shall be removed and internal wall surfaces cleaned.

14.3 Welds shall not be closer to each other than 150 mm or one pipe diameter, whichever is smaller, excepting connections provided for impulse and instrumentation purposes.

15 Instrumentation connection

15.1 Pressure sensing points shall be provided on the inlet and outlet of all modules to facilitate fitting pressure recording equipment, except for units with inlet pipework less than 50 mm nominal bore, where no sensing point is required on the inlet.

15.2 The size and location of sensing points shall be chosen so that the instrument measures the bulk condition of the stream and not local disturbances.

16 Auxiliary systems

16.1 Auxiliary and impulse lines shall be provided with their own separate valved connections. For impulse lines to slamshut valves, refer to **10.3**.

16.2 Where an auxiliary system is not specified, valved and plugged connections shall be provided on the inlet and outlet pipework as shown in Figures 1 to 6.

16.3 Impulse lines shall be positioned to reduce the risk of mechanical damage and shall not impede access for maintenance of components.

16.4 The impulse pipework design shall allow for commissioning, testing and purging without breaking any compression fittings.

16.5 Modules, where specified, shall be delivered with auxiliary systems installed.

16.6 Isolation valves of auxiliary systems shall be plug or ball type and conform to BS EN 331 requiring 90° operation from fully open to fully closed. They shall be of a tamperproof design or the operating handles shall be removable.

16.7 Sufficient connections shall be installed in the auxiliary rail to facilitate easy removal of components and pipework for maintenance purposes.

16.8 Where the main and pilot regulators are unable to withstand full inlet pressure in the sensing chamber, the auxiliary/pilot system shall protect the main regulator and final pilot diaphragms from over pressure. For 'J' and 'K' type systems this protection shall consist of a pressure relief valve positioned upstream of any inspirator or jet. Separate impulse lines shall be provided for each outlet pressure control pilot.

16.9 Connections for the auxiliary systems and impulse pipework shall be as indicated in Figures 1 to 6.

Annex A (informative)**Example of enquiry form for regulator modules (inlet pressure 75 mbar to 7 bar)**

MODULE ENQUIRY FORM										
Pressure Regulating Module (Inlet pressure above 75 mbar up to 7 bar)										
TO:	Name of Qualified Supplier:									
Form Completed By:				Signature:			Date:			
FROM:	Contact Name:									
	Site Address Name:									
	Project Reference:									
	Gas Transporter's Address:									
Telephone No:					Fax No:					
DESIGN SPECIFICATION										
	Minimum		Normal		Maximum					
Inlet Pressure (bar)										
Outlet Pressure (bar)										
Flow Rate (s.m ³ /h)										
Mode of Operation	Slamshut + Monitor + Active:						Slamshut + Active:			
	Slamshut + 2 Stage Control + Monitor Override:						Monitor + Active:			
Number of Streams	(a) Single		(b) Twin		(c) Multiple			If (c) number of streams		
Inlet Connection	Horizontal		Vertical		Outlet Connection		Horizontal		Vertical	
Degree of Standby as a %										
Size (compact/wall/kiosk)										
Maximum noise level dBA & dBC										
Telemetry requirements										
Page 1 of 2										

Type of Control	Fixed Pressure		Volumetric		Variable Set Point			
Component Set Points, Accuracy Group/Class(AG/AC) and Lock-up Class(SG)								
Slam Shut Valve	Set Point (bar)		AG:					
Relief Valve	Set Point (bar)		AC:		SG:			
Monitor Regulator	Set Point (bar)		AC:		SG:			
1st Stage	Set Point (bar)		AC:		SG:			
Active Regulator	Set Point (bar)		AC:		SG:			
Stream Discrimination	No		Yes		Type			
Creep Relief Required	No		Yes		Type			
TYPE OF LOAD	District		Industrial		Gas Turbine/Boilers			
	Other (specify)							
If Industrial/Turbine/Boilers answer the following questions:								
What is Q_{max} before Shutdown?								
What is Time to Start Up/Shutdown?								
Volume of Pipe between PRI & appliance?								
SPECIFIC REQUIREMENTS								
Impulsing (stainless steel): Approved to GIS/F9-1 and GIS/F9-2.								
Painting specification			Colour					
Commissioning assistance required		Yes		No	Training required		Yes	No
Delivery date required by								
Shipping conditions								
Delivery location/Offloading on site								
Design specification and fabrication codes. List:								
Additional Requirements								
Page 2 of 2								